



Rapid Surface Sampling and Archive Record (RSSAR) System



Developer: General Electric Corporate R & D Center
Contract Number: DE-AC21-93MC30174
Crosscutting Area: CMST

Deactivation & Decommissioning FOCUS AREA

Problem:

Current "wipe test" type methods for characterizing the extent of organic contamination such as oils, chlorinated hydrocarbons, polynuclear aromatic hydrocarbons, and polychlorinated biphenyls (PCBs) on building surfaces are inefficient, expensive, subject to operator variability, gives non-reproducible results, and expose workers to the added health and safety risk of solvent vapors. More cost effective methods for sampling and sample handling are needed to deal with the extremely large areas requiring characterization at Department of Energy (DOE) sites.

Solution:

The development of an instrument to economically sample concrete and steel surfaces, provide a near real-time "quick-look" measurement for the presence or absence of semi-volatile organic contaminants, and collect samples for later, more detailed analysis in a readily accessible and addressable form is needed.

Benefits:

►Improved reliability and reproducibility

- Reduction of worker health risk
- Cost reduction over current characterization methods
- Technology applicable to multiple DOE and industrial sites
- More efficient qualification for material recycle or disposition



Technology:

The Rapid Surface Sampling and Archival Record (RSSAR) System was planned as a modular instrument made up of several components:

- Sampling heads for thermally extracting the contaminants from concrete and steel surfaces. Separate heads for concrete and

steel surfaces and for bulk material were developed.

- Quick-look detectors to give a rapid (near real time) assessment of contamination levels. Both photoionization and ultraviolet absorption detectors were developed.

- Multi-sample trapping module to trap and store vaporized contaminants in a manner suitable for subsequent detailed laboratory-based analyses.

In Phase I, sampling heads for concrete surfaces and bulk samples were designed, built, and demonstrated. The sampling heads are integrated with "quick look" and single sample trapping modules to form a test system.

Development of an archival multisample trapping module was conducted for Phase II to replace the single-sample trapping module demonstrated in Phase I. This will allow the sampler to trap up to fifty separate samples in a convenient manner, and transfer them to a modified commercially available thermal-desorption autosampler for subsequent analysis. A steel-surface sampler head was built and demonstrated. The fully integrated



laboratory scale system was constructed, with each component engineered for direct integration into a functional portable prototype.

Project Conclusion:

This contract was terminated in May 1997 at the conclusion of Phase II, because it was determined that technologies better suited to DOE needs are available. Results from Phase II testing of the RSSAR system indicated that the basic concept of using thermal desorption for sampling of various semivolatile organic contaminants from building surfaces and materials is viable. Sampling of model contaminants representing PCBs, oils, and polyaromatic hydrocarbons resulted in sufficient recoveries of contaminants to assess building contamination levels in a much more representative manner than current technology using wipe samples. Additional research and development (R&D) work is required to optimize the design of the sampling heads, multisample trapping module, quick-look detector, and thermal desorption autosampler for field application of the RSSAR system.

Continued R&D activities are planned by GE and its subcontractor, EAI Corporation, Inc., in their effort to commercialize the technology developed in this project. This R&D work, which will not be funded by DOE, is to include re-evaluation of the instrumentation based on customer feedback, in-house testing, and outside consultant input. DOE/FETC funding of this

contract was concluded prior to the passage through Gate 4, with the technology in the Advanced Development stage of technology maturation. No (site) commitment to use this technology could be secured prior to the conclusion of this project.

Contacts:

The General Electric R & D Center conducts research in a wide variety of disciplines. The Environmental Laboratory develops cost-effective technology to address remediation, pollution prevention and product stewardship needs. For information on this project, the contractor contact is:

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